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East Europe Report

SCIENTIFIC AFFAIRS

No. 694

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CONTENTS

HUNGARIAN-SOVIET AGRICULTURAL COOPERATION PROVING FRUITFUL

Budapest MAGYAR HIRLAP in Hungarian 11 Jan 81 p 11

[Excerpts] According to Istvan Tamassy, academician, head of the Department of Agronomics of the Hungarian Academy of Sciences, corn hybrids resistant to corn mold and corn smut have been developed by cooperating Hungarian-Soviet scientists. Experiments on test plots have already resulted in yields which exceed the average by 5-6 quintals. Since the new varieties are early and semi-early maturing, they are suited for large-scale growing in many parts of the Soviet Union. Research veterinarians of the two countries collaborate in combatting poultry infections and have evolved a serum which is highly effective in immunizing geese against viral infections of the digestive tract.

Important basic research in the genetics of plant improvement is also in process between the countries. This involves Tamassy's field of specialization: mutational genetics and plant improvement. It was found that by applying small doses of hyper-mutagenic chemicals to plants, rapid changes in their genetic structure could be achieved. Improvements normally attained in 20 years can be achieved in 8-12 years. Hungary receives the chemicals for such experiments from Soviet research institutes. The Soviet substances have proved to surpass any known from the West in their effectiveness.

Commenting on Hungarian-Soviet cooperation, Pyotr Vavilov, president of the Academy of Agriculture of the Soviet Union, says among other things: "I feel that Hungarian experiences in organization can set us an example. I am thinking of the good results attained by combining large-scale production with that of the private plots.

"Organization of complex foodstuff-producing farms where processing facilities are linked to agricultural production are worth emulating. It seems an economically sound practice on the large scale to have agriculture be an integrated part of the food processing industry which it serves. We are now conducting our first experiments with this type of combination. Naturally, organizational methods cannot be adopted unchanged because of differences in the sizes of the areas or facilities involved."

CSO: 2502

PROGRESS IN FIELD OF NEUTRON PHYSICS CITED

Tirana ZERI I POPULLIT in Albanian 11 Oct 80 p 3

[Article by Agim Minxhozi and Perparim Fuga from the Institute of Nuclear Physics: "Neutron Physics in the Problems of Production"]

[Text] The Eighth Plenum of the Party Central Committee assigned important tasks in the studies of nuclear physics. Among other things, the following was stressed at the plenum: "Studies must be extended in thw physical sciences and research works carried out in the problems of applied nuclear physics. And, the methods of neutron physics must be assimilated and used in the service of production."

Of course, to apply these very important recommendations demands analyses of the present results with a critical eye; it requires the knowledge of the present and future requirements of production.

One of the main directions of the development of nuclear physics in our country has been and is neutron physics. If we consider its role as a science, neutron physics, along with its contribution to the development of physical knowledge of our time, has given results with a great practical value in nuclear analytics, in the production of radioactive isotopes, in the construction and utilization of nuclear reactors and in the nuclear energy resources and so forth.

Taking into consideration these results and on the basis of the concrete needs of our country, the material base and the cadre level, great prospects are opened for the development of neutron physics in our country.

In the framework of neutron physics, priority has been given so far to the method of neutron activation. The requirements for its development and utilization stemmed from the increasing needs for precise and rapid analyses at low costs in the various links of production. The core of the method consists in the radio-activation of the component elements of a sample during its bombardment with neutrons. With this method, it is possible to obtain very positive indicators both in quality and in costs. In general, the time for an analysis does not exceed 20-30 minutes. As a result of the means that we have, it has been possible, for example, to obtain the analysis of proteins in corn in one minute, and to determine the content of copper in its minerals in about 2 minutes and so forth. Also, after the initial investment with basic equipment, the cost of the analysis is very low in the majority of the cases. Of course, the criteria, according to which, in this or that case, this or that method will be used, constitute an

object of a more complete discussion. The activation of neutrons is a determined vantage point which, in many cases, creates the most suitable view; therefore, it is being used more and more successfully.

In the development of neutron activation, gradually progressing, we have concentrated mainly on some geological problems. The first positive result was the simultaneous determining of aluminum and silica in the bauxites. Since then, activation appeared as promising. Let us stress the fact that the time for an analysis is not more than 12 minutes.

Geology has always been the most important object of the scientific research work in the field of neutron physics at the Institute of Nuclear Physics. With only a weak source of neutrons, some new element determining methods have been assimilated and put in the service of production, such as: vanadium in bituminous schists; copper in mineral samples; and boron in various mineral samples. In all these cases, the utilization of neutron activation is more profitable than the use of the other analytical methods.

Experiments have also been carried out in the service of petroleum for some years. Cooperation has produced fruitful results. To determine the quantity of vanadium in petroleum and the quantity of water, which is of great importance, especially to find the water-petroleum border, neutron activation is the only way to a solution which has been found so far in our country. The aim has been that the results of experiments and of scientific studies have as much practical value as possible and be rapidly implemented. Despite the initial difficulties, now all the results obtained are directly used in production. In regard to those enterprises or institutions, where the volume of demands has been large, the necessary material base has been assured and cadres have been trained at the Institute of Nuclear Physics. While, the series work is carried out in their laboratories. As a result of increased number of determined elements with neutron activation and by correctly analyzing the economic indicators, we believe that the conditions are ripe so that this activity can also begin in the other enterprises and be strengthened in those enterprises which have initiated it. The selection of suitable cadres that work or that will work in these laboratories must be conducted with great care, because, there are cases when specialists of other professions work in the place of physicists. Facts show that where work has not progressed at the required pace this has resulted from the fact, among other things, that physicists have not been employed.

Those are some of the results with a practical value in the field of the activation of neutrons as a part of neutron physics. In the process of their fulfillment, many basic concepts of neutron physics had to be experimented and assimilated, such as: the measurement of the effective sections of the joint action of neutrons and atom nucleuses; the determining of the schemes of the analysis of some radioactive isotopes; the study of the absorbent effects of matrix in the activation of neutrons; the recording of neutron fluxes; and the studies in the field of gamma spectrometry; and a number of calculating methods for the most intensified treatment of experimental information have been improved.

This experience gained, the supplying of a new and stronger technology and the further training of our scientific cadres will create new possibilities for the data of neutron physics to be implemented in other fields in our country.

Progressing in this direction, lately, work has begun for the assimilation and utilization of a neutron generator which is more powerful than the source which we have been using until now. With the effective utilization of this generator, work in neutron physics will be intensified and expanded and a new invigoration will be given to the activation of neutrons. The coming five-year plan will be a new leap forward. Always responding to the party recommendations for giving priority to geology, petroleum and agriculture almost all our efforts will be concentrated in these directions. Thus, the complex analyses of minerals will begin, their perceptibility and precision will be increased and the number of determined elements will be increased.

During this five-year plan, the general study of the protein content of food products will also begin. For the needs of agriculture, the use of neutron radiation in the aid of selectioning will also be carried out. The study of the content of oxygen in steel has been planned to assist the metallurgy and the machine industry. However, the time has come, along with these direct applications which have played the greatest role in the present achievements and which, undoubtedly, will continue to do so in the future, too, for us to deal with the more essential and more generalized studies of neutron physics, such as the neutron multipliers of physics of reactors and so forth. The study, construction and experimenting of a neutron multiplier is an important objective for the near future. This project will be implemented by our specialists and will, undoubtedly, be the most important achievement in neutron physics of the coming five-year plan.

This plant will create conditions for the preparation, and training near the plant, of the cadres who will further lead the development of neutron physics in general and of reactors in particular. The reactor, as a powerful source of neutrons, increases millions of times the perceptibility of analyses, in comparison with those made with other neutron sources, and gives a complete answer to many difficult analytic problems; it also creates the possibility for studies in the field of biology, the machine industry and the production of some shortlived isotopes and so forth.

The important tasks entrusted to us require the further improvement of the scientific level of our cadres. In this regard, a greater concern is required because, lately, the work for the training of cadres has been insufficient. Also, our collective forms of training are not at the desired level. It is known that the training of a scientific worker at a higher level requires time, therefore, we must seriously think about the ways and deadlines for solving this problem, directly connected with the fulfillment of established tasks.

In the struggle to fulfill these objectives, cooperation and coordination with the various enterprises and institutions will always be increased and always more and more workers from the most varied fields will be involved in studies and experiments and, crowning them with success, will make their contribution to the entire development of the country.

9150
CSO: 2102

PULSE LASER RESEARCH IN CSSR REVIEWED

Prague JEMNA MECHANIKA A OPTIKA in Czech No 11, Nov 80 pp 314-316

[Article by Eng Helena Jelinkova, Candidate of Sciences, Faculty of Nuclear and Physical Engineering [FJFI] Prague: "Pulse Lasers"]

[Text] This article treats the basic properties and parameters of solid state pulse lasers and infers from them the usefulness of the various types of these lasers in the laboratory and in industry. In addition the development of ruby systems by the Department of Physical Electronics, FJFI, in the last 15 years is surveyed

1. Introduction

Since the first source of coherent radiation was obtained in 1960, 20 years have passed, and during this period laser research and technology have obtained important results. Today lasers cover the radiation spectrum from ultraviolet to far infrared. We classify them according to the nature of the active medium that produces the radiation as solid state, liquid, gas or semiconductors, and according to the nature of the radiation as pulse or continuous wave lasers. This article will deal with solid state pulse lasers.

2. Solid State Pulse Lasers

In recent years a large number of solid state laser materials and interesting technological applications have been discovered. Pulse lasers have found application in materials processing, holography, medicine, target illumination and designation, the measurement of distances to satellites and the moon, thermonuclear fusion and plasma fusion, and currently are used in scientific work requiring high density light radiation outputs. An important precondition for the development of these applications has been improvement of the reliability of these systems. Accordingly the emphasis has now been shifted from research and innovation to reduction of price and improvement of the properties of individual systems.

Let us first consider the active media used most frequently in these lasers. They are:

1. Synthetic ruby, $Al_2O_3 + Cr^{3+}$;

2. Nd: YAG, Ne: $Y_3Al_5O_{12}$;

3. Neodymium-activated glass.

Let us briefly note certain properties of these materials, because it is from these that the uses of the individual types of laser in the laboratory and in industry stem.

Table 1. Comparison of the Parameters of Ruby, Nd:YAG and Nd Glass

Parameter	Dimension	Ruby	Nd:YAG	Nd Glass
Laser wavelength	nm	694.3	1064.1	1062.3
Photon energy	J	2.86×10^{-19}	1.86×10^{-19}	1.86×10^{-19}
Stimulated emission cross section	cm^2	2.5×10^{-20}	88×10^{-20}	3.03×10^{-20}
Spontaneous emission lifetime	ns	3000	240	300
Dopant concentration	cm^{-3}	1.58×10^{19}	1.38×10^{20}	2.83×10^{20}
Fluorescence linewidth	nm	0.55	0.40	26.0
Heat conductivity (300 K)	$Wcm^{-1}K^{-1}$	0.42	0.14	0.012
Inversion for 1 percent gain per centimeter	cm^{-3}	4×10^{17}	1.1×10^{16}	3.3×10^{17}
Stored energy for 1 percent gain per centimeter	J/cm^3	0.115	0.002	0.060

First, these materials differ as active laser media in terms of the wavelength of the light they generate (see Table 1). Neodymium glass has a very broad fluorescence linewidth compared with ruby and neodymium YAG crystals. The dopant concentration is lowest for ruby and highest for neodymium glass. The heat conductivity is highest for ruby, being 3 times as great as for YAG crystals and 35 times as great as for neodymium glass. Another important property is the emission cross section, which enables us to calculate the inversion required to obtain a given gain coefficient and the stored energy for a given gain coefficient. These parameters are shown in Table 1. Neodymium YAG has the lowest inversion requirement for a gain of 1 percent per centimeter of length of the laser material. Accordingly, the Nd:YAG crystal has by far the lowest laser threshold, and it is thus the most suitable material for a continuous wave laser. On the other hand, the ruby crystal and neodymium glass can store much more energy at a given gain.

A further important parameter is the temperature dependence of the characteristics of the laser material. The main reason for the temperature dependence of the lasing threshold and the output power stems from changes in the fluorescence linewidth, the atoms' lifetime in the excited state and the quantum efficiency.

Other parameters which affect laser operation when the temperature changes are variations in wavelength, end conductivity, refractive index and thermal expansion coefficient. A comparison (from Table 1) enables us to determine that the ruby laser is extremely temperature dependent, as a result of the strong dependence of linewidth on temperature. Nd glass has almost no sensitivity to temperature changes, and Nd:YAG is more affected than glass but less than ruby. For example, a ruby laser operating at 77 K has a threshold output pumping energy 2 orders of magnitude lower than it does at room temperature. This energy is lower by a quarter and a half respectively for Nd:YAG and Nd glass in the same temperature range.

It follows from the enumeration of these parameters that neodymium lasers with neodymium glass as an active medium are used when high output powers are required (thermonuclear systems) and when a high repetition frequency is not required. Nd:YAG lasers, on the other hand, are used in systems with a high repetition frequency and in continuous wave lasers. The output energy is, however, extremely low. Ruby can be used as the active material to achieve medium energies and medium repetition frequencies. But ruby is always used when light in the visible region is required. It is necessary to use a frequency multiplier when the two other active media are used if we want to obtain radiation in the visible range.

3. Lasers From CVUT-FJFI [Faculty of Nuclear and Physical Engineering, Czech Institute of Technology]

The first laser was operated in the Department of Physical Electronics, FJFI in 1964. This was a ruby laser operating in the free-running mode. The principle of Q switching was tested in 1965 on a system with a new type of spherical pumping cavity developed at FJFI. Modulation of the Q value in this case was achieved by means of a mechanical shutter: a rotating prism. Work on dual Q switching (mechanical plus photochemical shutters) began in the same year. In 1967 a laser with a neodymium glass active medium and a power of 50 MW was built. The beam from this laser was concentrated for the first time in Czechoslovakia by ionization, i.e. a spark discharge in air. During these years, experiments connected with laser applications (drilling of materials, microwelding) were conducted. Starting in 1970 the organization directed its attention to applications of pulse lasers in the following areas:

a. Measurement of large distances on the radar principle;

b. Plasma generation;

c. Measurement of air pollution by Raman scattering.

It was in 1970 that the first reflections from manmade earth satellites was achieved at a distance of 1500 kilometers, with a ruby oscillator-amplifier system. The output of this system was 150 MW. For plasma generation purposes a system with a neodymium glass active medium developing 15 J in a 20-ns pulse was built.

The abovementioned goals necessitated the development of new lasers with shorter pulses and higher powers. Progress in the investigation of photochemical shutters was made. To improve switching stability and effectiveness, the new dye dicarbocyanin DDI+ was proposed and produced. The time and temperature stability of shutters made with a solution of DDI+ in methyl alcohol, compared with the commonly-used cryptocyanine solution CCI, are shown in Figure 1.

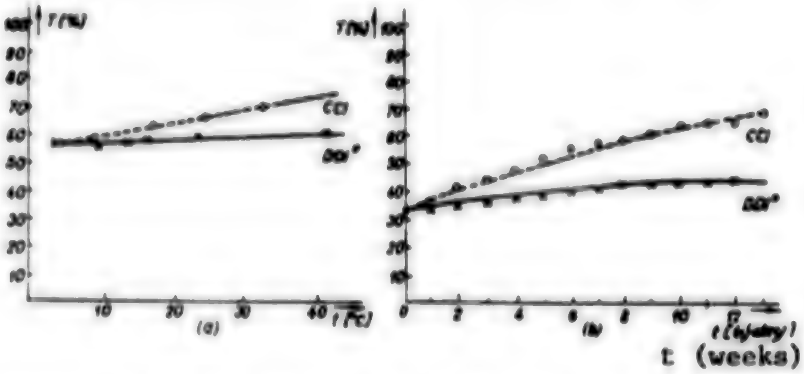

Figure 1. Comparison of the Stability of Solutions of DDI+ and CCI. (Measured at a wavelength of 694.3 nm.)

Key: (a) Temperature stability (b) Time stability

This dye is currently used in the laser systems of Czechoslovak and French satellite radars.

On the basis of findings regarding mechanical and photochemical shutters it was possible to obtain reproducible giant pulses by combining these two Q switches, the rotating mirror and the DDI+. This principle was used to construct a standard ruby laser transmitter for measuring the distance to manmade satellites. A block diagram of this laser is shown in Figure 2.

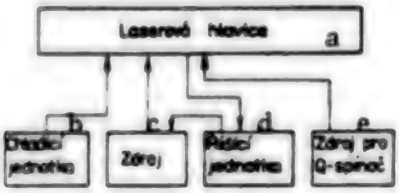

Figure 2. First Generation Laser Transmitter

Key:
(a) Laser unit
(b) Cooling unit
(c) Power supply
(d) Control unit
(e) Q-switch power supply

The system is highly automated. Switching on the control panel initiates cooling of the laser and the rotation motor; the temperature of the coolant in the laser is maintained within ±0.1°C. The width of the pulse generated is 15-20 ns, its energy 1 J, the repetition frequency 1 Hz and the pulse reproducibility ±5 percent. Currently laser transmitters of this type are operating in 11 Interkosmos laser satellite observatories.

A similar system (with an adjusting telescope) has also been used in the last 2 years for manufacturing purposes in the annealing of semiconductors.

To obtain pulses shorter than 10 ns, the technique of pulse shaping with a Pockels cell has been extensively developed. Several systems involving generation of short pulses, in the nanosecond range, by pulse pruning outside or inside the cavity, as well as the PTM [pulse transmission mode] technique, have been proposed and tested experimentally. Here we list some of these experimental devices.

a. A system for pulse pruning outside the cavity is shown in Figure 3. A Pockels cell is used to prune a pulse with a width governed by the delay line from the giant pulse that is generated. The pruned and residual pulses are shown in Figure 4.

Figure 3. Experimental Arrangement of System for Pruning Pulses Outside the Cavity

Key:
J--laser-switched spark gap
Z--Cavity mirror
Q--Q switch
AM--Active medium
PC--Pockels cell

Figure 4. Pruned and Residual Pulses (at left, 5 ns/div; at right, 10 ns/div)

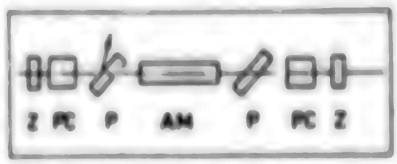

Figure 5. System for Intracavity Pulse Pruning

Key:
Z--mirror
PC--Pockels cell
P--Polarizer
AM--Active medium

b. If the output cavity mirror has relatively high reflectivity, pulse pruning outside the cavity has the disadvantage of loss of pulse energy. Accordingly, the scheme summarized in Figure 5, in which pulses are pruned inside the cavity by means of an optical shutter located within the cavity, is more useful. The pulse length is again governed by the length of the delay line. This system was built under laboratory conditions using both a ruby crystal and Nd:YAG as the active medium.

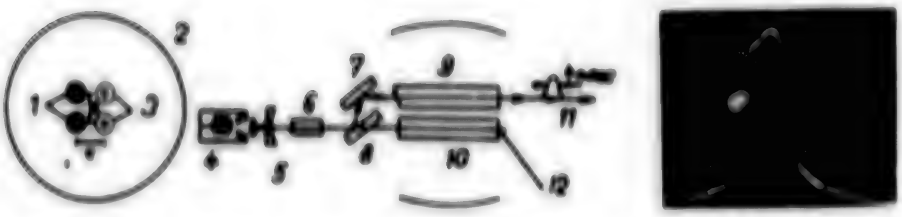

Figure 6. Arrangement of Second-Generation Laser Transmitter. Output Pulse 2 ns/div. Detector Circuit Rise Time 0.7 ns.

Key:

(1)	Ruby crystals	(7)	Polarizer P2
(2)	Ellipsoid of rotation	(8)	Polarizer P1
(3)	Discharge tubes	(9)	Amplifier
(4)	Optically switched spark gap	(10)	Oscillator
(5)	End mirror, R = 70 percent	(11)	0.8-joule output
(6)	Pockels cell	(12)	Front mirror, R = 8 percent

The so-called PTM system is of course the most advantageous in terms of power output. This system was developed at our facility and applied in second-generation laser transmitters for the Interkosmos project. An optical diagram is shown in Figure 6.

The system uses 2 switching stages: (1) an electric spark discharge (Q modulation, giant pulse generator), and (2) a laser-switched spark discharge (PTM function). A disadvantage of this system is that the pulse width is not variable. Its width is governed by the physical length ℓ of the cavity: ($\Delta t = 2\ell/c$, where c is the velocity of light). For our equipment the width Δt of the pulse generated was 4 ns. Of course the output power of this pulse is greater than in the cases mentioned above (it reached 250-300 mJ in our case). The whole device, a laser transmitter developed on this principle in our department, is a two-stage unit. It consists of an oscillator and an amplifier, which because of required dimensional limitations are located in a single reflective ellipsoidal cavity (so-called "compact arrangement").

d. To conclude this section let us mention also the possibility of obtaining laser light with pulses shorter than 1 ns and output powers on the order of 100 MW. A switching system which again uses electrooptical shutters has been developed, producing pulses with widths on the order of hundreds of picoseconds.

An Nd:YAG pulse laser and a ruby laser operating in the mode-locking condition have been built for spectroscopic measurements in plasma experiments. A diagram of the experimental arrangement is given in Figure 7. The length of the pulse generated is in the vicinity of 20-30 ps (measured by the two-photon fluorescence method), and the output power of one nonamplified pulse is about 1 mJ.

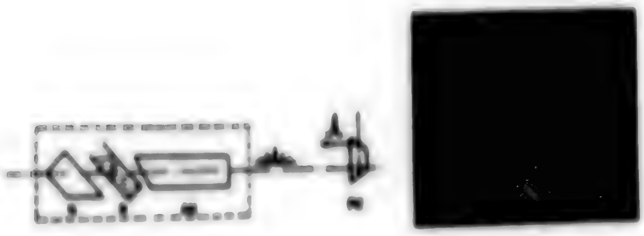

Figure 7. Experimental Arrangement for Generating Mode-Locked Pulses.
(At right, one pulse from pulse train; 1 ns/div)

Key: R--Prism
Q--Saturable absorber
AK--Active medium
PC--Pockels cell

All of the systems described above were implemented in cooperation with the Society for Chemical and Metallurgical Production, Usti nad Labem (ruby crystals grown by the Verneuil method) and the Monokrystaly Turnov enterprise (ruby and Nd:YAG crystals grown by the Czochralski method and KDP and KDDP crystals). The laser with Nd glass active material was developed in cooperation with the Institute of Physics, USSR Academy of Sciences. The optical components of the cavity were developed by the Dioptra Turnov national enterprise and the telescopes in cooperation with the Natural Sciences Faculty, Olomouc. The xenon discharge tubes used in the lasers were produced by the FJFI in cooperation with UFP CSAV [Institute of Plasma Physics, Czechoslovak Academy of Sciences].

4. Conclusion

This article describes several laser systems developed by the FJFI in the last 15 years. During this time we developed not only laboratory lasers used to carry out physical experiments but also applications lasers, currently in use, for example at:

--The Monokrystaly Turnov national enterprise, for testing crystal slices;
--UJV [Nuclear Research Institute] Rez, for annealing semiconductor materials;
--Tesla VUST, for measuring atmospheric pollution;
--13 Interkosmos observatories, for measuring the distances of manmade satellites from earth.

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NEW INTEGRATED CIRCUIT RESEARCH FACILITY DESCRIBED

Prague RUDE PRAVO in Czech 3 Dec 80 p 4

[Article by Michal Strida: "Cleanliness and Precision Are the Basis"]

[Text] The ceremonial opening of a new facility at Tesla VUST [A. S. Popov Research Institute of Communications Engineering] looked more like a visit to a hospital. All the members of the delegation were dressed in white coats and confectioner's hats and they would have preferred to give us all another good wash before we went in, because people are the worst polluters of the environment in which processes involved in the manufacture of complex circuits are carried on. It can be said to a certain extent that they themselves present the greatest danger to this type of production, which in many respects exceeds their average individual capabilities.

Even the pattern for a complex integratee circuit, from which the individual wafers are subsequently prepared lithographically, must be prepared a 200X magnification with a precision to within several hundredths of a millimeter. This is beyond even the best draftswoman. And the drafting of the circuit, concluding with the drafting of the pattern for the mask on the basis of which the individual circuit chips are prepared, is done by a coordinate plotter controlled by a computer.

The process for the manufacture of such circuits, where the actual size of the individual components is only a few thousandths of a millimeter, accordingly requires qualitatively new, immensely precise process equipment, highly precise control processes, chemicals and reagent gases of the highest chemical and mechanical purity, and a working environment from which virtually the tiniest particles of dust have been removed. This is the reason for the meticulous care and cleanliness in the operation of the new facility at Tesla VUST.

Narrowing the Gap

Tesla VUST is a facility with a long tradition in the production of semiconductor components. In the 1950's the first Czechoslovak germanium diodes, point-contact and junction transistors and the first experimental transistor receiver were developed here. In spite of a relatively timely and successful start in the development of semiconductor engineering there occurred not only here, but in practically all the socialist countries, a certain, not exactly small, lag behind the developed capitalist countries in this field.

One of the assignments of the 15th CPCZ Congress was that of keeping this gap from widening during the Sixth Five-Year Plan and creating the conditions for overcoming it. It was possible to accomplish this task only by concentrating material and personnel resources in certain production and research facilities and by their nationwide specialized management, which was carried out by the newly created CSSR Ministry of the Electrical Engineering Industry.

Two specialized production bases, of Tesla Pestany and Tesla Roznov, gradually emerged in Czechoslovakia, along with a scientific and pedagogic facility in the Microelectronics Department of theElectrical Engineering Faculty of CVUT [Czech Institute of Technology] in Prague, and finally the newly-opened central facility in VUST for the design of large scale integration (LSI) circuits (complex circuits with a large number of functional components), primarily of the so-called "unipolar" type, which have the international abbreviation MOS.

A Dust-Free Environment

The entire facility in VUST takes up only 250 square meters on two floors. It is really a building within a building. The interior is protected against dust, the greatest enemy of the production of integrated circuits, which causes the percentage of defective components to exceed 60 percent in the leading world producers of these devices, by sealed doors, and particularly by superior climate control supplied by Elektromat Drazdany. The equipment for superior water filtration was supplied for the facility by the Kavalier national enterprise.

On the second floor, where the individual diffusion-treated and lithographically processed wafers for the future circuits are etched, the number of dust particles smaller than a thousandth of a millimeter may not exceed 200 per liter. This would not seem to be extreme purity, but if someone so much as combed his hair here, the air conditioning would have to work a rather long time trapping all the dust, of which human hair is a r'ch source. For this reason neither eating nor smoking is permitted here. All work must be performed wearing gloves, not only on account of the acids with which the surfaces are etched, but especially for the sake of cleanliness. You might wash your hands as thoroughly as you wished, but if even an ungloved finger happened to be dipped into the double-distilled water which is used to wash the circuits after etching, the water would instantly become excessively dirty.

The cleanliness must of course be 200 times as great on the first floor, on which are located the diffusion ovens in which the individual wafers for the future circuits are subjected to diffusion. In the lithography room, which is separated from this area by a glass wall and additional sealed doors, and into which only people who have been subjected to a decontamination process may enter, the cleanliness is practically absolute. Accordingly people must work with masks over their mouths. The temperature on both floors can be controlled when necessary to within 1 degree Celsius.

For Production

This meticulous and in some degree excessive cleanliness which is maintained in the production facility is essential, for it makes it possible to determine in which stages of the process for producing integrated circuits, and to what degree, this

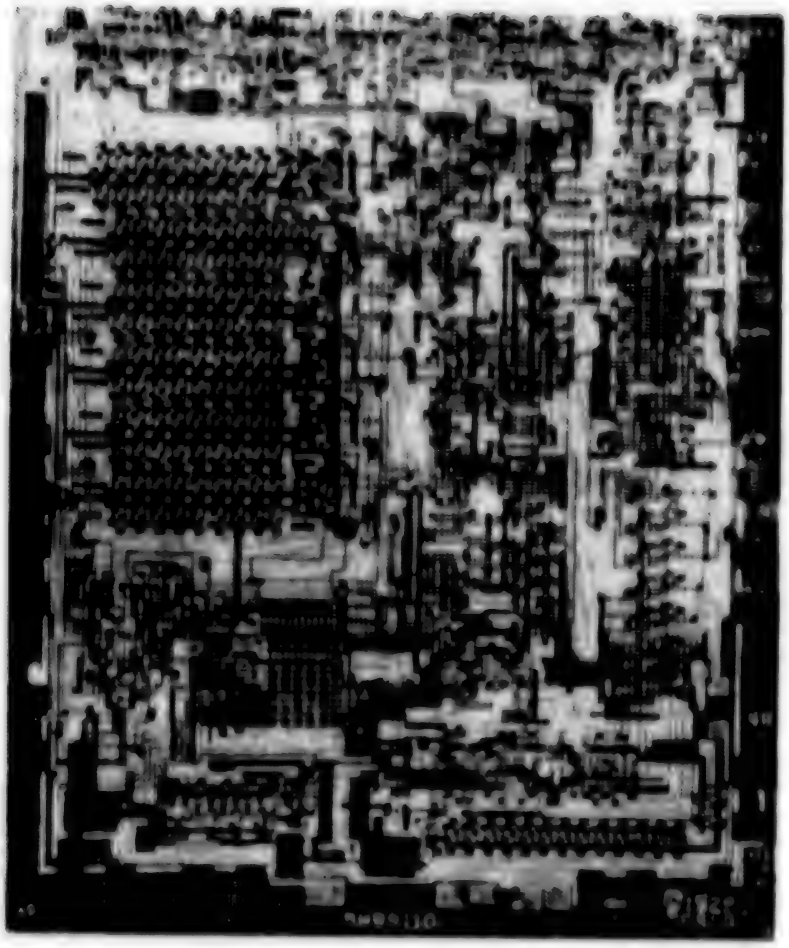
meticulous cleanliness must be preserved in their mass production, when it is possible to limit it only to a specific operation or working area, and when it can be dispensed with altogether. All this has a favorable effect on the size of production expenditures.

Today the new facility at Tesla VUST is verifying the integrated circuits for a branch electronic exchange which will be produced by Tesla Liptovsky Hradok, the circuits for pulse telephone dialing (the whole number is dialed by pressing the keys on a keypad), and certain special circuits, e.g. circuits for an electronic alarm clock and memory circuits.

A commitment made by the Tesla VUST workers when this facility was opened is directed at the consumer electronics field: that of designing and testing by mid-1982 an integrated circuit for a scientific calculator. While the circuit shown in the photograph contains 40,000 components and is comparable in complexity with the layout of an okres capital including its netowrk of mains, the proposed calculator circuit would contain 100,000 components and would have a complexity roughly equivalent to the layout of a kraj capital city. This would be an integrated circuit of the next generation, which is impatiently awaited.

We frequently speak of a new generation of computers or integrated circuits without taking account of the fact that this is not only a technical problem, but a social one as well. For it is no accident that the main guarantor of the design of the integrated circuit for the calculator is the plant committee of the Union of Socialist Youth in Tesla VUST. Under the leadership of experienced experts, new generations of integrated circuits are created primarily by new generations of young engineers. Accordingly it must not be forgotten that accelerated development in microelectronics is not only a technical problem but especially a human problem, as is its application.

Alena Cermakova at work in the lithography room.



The actual dimensions of this integrated circuit are 3.5 x 4.1 mm.

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ENERGY PRODUCTION FROM LIVESTOCK WASTES DISCUSSED

Prague ZEMEDELSKE NOVINY in Czech supplement ZEMEDELEC 3 Dec 80 pp 3-4

[Article by Eng M. Dubsky: "Using the Energy Value of Liquid Manures"]

[Text] Animal wastes (manure) from stables in which straw or other organic materials are used as litter are composted, then taken to the fields and plowed into the soil. This enriches the soil in the humus-creating organic material without which good yields cannot be expected. However, today there exist many stables and other facilities with large concentrations of livestock which use so-called "litterless" method, in which the wastes (manure) are flushed away with water into tanks. These liquid manures can be used to fertilize the fields only when the growth period allows; for the rest of the year they are kept in the tanks. Optimally the tanks are sufficient for 3 months. They fill the surroundings with an unpleasant smell. The intensity of the odor from the stored manure is several times greater than that of the fresh material because the organic materials begins to decompose after a certain time, with losses amounting to 30 to 60 percent. These liquid manures have, however, great energy value in the dry state. Because they are mixed with water (rinsed away in the stable) they become unsuitable for direct energy utilization by combustion.

The fact that Czechoslovakia raises more than 7 million pigs, 4.75 million cows and more than 37 million chickens and other poultry, which produce a great quantity of solid waste that could be used for power production, led the staff of Hydroprojekt [State Institute for the Design of Hydraulic Construction Projects] to give some thought to the situation and to propose a method of using the material. This entails the use of a controlled anerobic process, i.e. one in which air is excluded from heated, covered containers, with suitable mixing. This produces biogas.

Biogas is a complex mixture of gases, consisting of about two-thirds methane (CH_4) and one-third carbon dioxide (CO_2). It also contains small quantities of nitrogen, hydrogen and hydrogen sulfide (0.1-0.5 percent). The heat value of this gas is 22,000-25,000 megajoules per cubic meter. This is twice the heat value of coal gas, which is 14,000 MJ/m^3. One cubic meter of biogas has the same heat value as 0.55 kilograms of light heating oil. The decomposed sludge which remains can be removed and is a valuable organic fertilizer with a high nutrient content. The organic substances which it contains are more stable and decay more slowly than the wastes in the tanks, i.e. the manure slurry. The decomposed manures give off ammonia very slowly because they contain it in the form of ammonium salts and humic acid salts.

The decomposed manure of domestic animals has a basic reaction and does not contain fats or colloids, and when used as fertilizer it does not acidify the soil or clog its pores.

When organic matter from animal wastes is decomposed in water slurry without the presence of oxygen, i.e. with air excluded, two processes go on simultaneously: acid fermentation and methane fermentation. The acid process produces fatty acids and accordingly the reaction is acidic. In the other process, organic compounds are decomposed into methane, carbon dioxide and water and the medium is alkaline.

The process is caused by methane bacteria, which cannot tolerate oxygen. Methane bacteria produce methane only from certain organic compounds. They multiply more slowly than the acid fermentation bacteria, and accordingly it is desirable to control the process in such a way that methane fermentation is the faster and predominant type. This can be done by influencing the reaction medium by means of the hydrogen concentration, the temperature, mixing, and the addition of material to be decomposed. Methane fermentation does not take place below +5°C. The higher the temperature, the faster the fermentation proceeds, up to 55°C; the pH of the reaction medium must not fall below 7.0.

All of the above was known when workers from the Rozvoj Posazavi unified agricultural cooperative approached Hydroprojekt Prague to establish their first contacts aimed at using their experience in the field. Hydroprojekt Prague had displayed a model unit for the production of biogas from animal wastes at the Zeme Zivitelka national exhibition at Ceske Budejovice in 1979. At a kraj exhibition of scientific and technical progress in the Central Bohemian Kraj held in June 1980 at Benesov in the Black Forest, Rozvoj Posazavi Jilove (West Prague okres) introduced the Hydroprojekt Prague model into its display and graphically demonstrated the principles of the use of this process in agriculture. Many visitors to the exhibition and agricultural workers evinced interest in this innovation.

Accordingly, Rozvoj Posazavi Jilove came to the Zeme Zivitelka 1980 exhibition in Ceske Budejovice not with a model but with a prototype unit for the production of biogas, which it put into operation. Hundreds and thousands of visitors saw its real capabilities, which could be implemented in a number of agricultural enterprises.

The main precondition for using energy from the manure of domestic animals in water slurries is that of obtaining gas through the viological process of methane fermentation. One ton of dried poultry manure can yield 600 cubic meters of gas, a ton of pig manure 500 cubic meters, a ton of stored cattle manure 450 cubic meters and a ton of dairy cow manure 350 cubic meters.

The individual types of domestic animals produce the following quantities of manure (calculated as dry material):

	kg/day	kg/year
Dairy cattle	5	1825
Store cattle	2.2	803
Range cattle	3	1095
Fattening pigs	0.4	146
Sows	0.8	292
Piglets	0.2	73
Fattening poultry	0.014	5.11
Layers	0.028	10.22

These numbers are for ordinary dry matter in litterless operations. The latter amount to 8 percent for cattle, 5 percent for pigs and 15 percent for poultry.

It has already been said that the decomposition time depends on the temperature. For pig manure, the fermentation takes about 3 weeks at a temperature of 33°C, while for cow manure it takes 4-5 weeks. The wastes are decomposed in the absence of air and stirred.

The biogas output achievable per domestic animal per day is as follows:

Poultry	1.7 cubic meters
Range cattle	0.9 cubic meters
Store cattle	1.2 cubic meters
Sows	0.4 cubic meters
Layers	0.016 cubic meters
Broilers	0.009 cubic meters

What kind of equipment is needed to produce biogas?

1. A fermentation tank: this may be steel, reinforced concrete, wood or glass-reinforced plastic. It must be watertight, airtight and corrosion-proof.

2. A filling and mixing unit, equipped with a pump, which must be able to pump out the tank contents in 1 to 2 hours.

3. A heating unit with a pump and 2 heat exchange systems (air-liquid and liquid-manure), with the fermentation tank being heated by liquid from the boiler. The boiler, with a combination burner, can be heated during operation by the biogas that is produced, but must be heated with an auxiliary fuel while starting up.

4. The gas tank.

Data on the economics of biogas production are approximate in nature and were worked out primarily on the basis of foreign figures. Biogas production becomes economically profitable at a daily output of at least 2,000 cubic meters. This corresponds to a concentration of approximately 1,200 dairy cattle, 10,000 pigs or 160,000 poultry. The assumed or approximate purchase price of such a unit is in the vicinity of 10 million korunas at current prices, and 1 cubic meter will cost 2.00 korunas.

Work to develop the technology and the process itself is continuing. The main organization working on the technology is Hydroprojekt Prague. It is also true that the methane process itself can be improved and speeded up. The Institute of Microbiology, Czechoslovak Academy of Sciences has taken on this task of finding out how best to control the methane fermentation and how to increase the quantity and speed of methane formation so as to decrease expenditures on the production of fermentation units.

All of this must be verified and tried out in practice, then applied more extensively. Rozvoj Posazavi Jilove, in cooperation with the partners mentioned, is trying out this method of producing biogas and will be verifying it in an attempt to find additional nontraditional forms of energy and to improve air quality by eliminating odor.

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BRIEFS

CSSR GEOLOGICAL SURVEY ABROAD--During the Sixth Five-Year Plan [1976-1980], Czechoslovak geologists participated in geological survey of 30 countries located on almost all of the continents, excluding Australia. In the Seventh Five-Year Plan, they will conduct geological survey in the Escambray mountain region of Cuba, to determine deposits of tin, zinc, lead and precious metals. In Vietnam, they will concentrate on deposits of pyrophyllite, which is used in manufacture of synthetic diamonds. Mozambique will be surveyed for iron, copper, asbestos and anthracite deposits. In 1981, a joint Czechoslovak-Mongolian geological enterprise MONGOLCZECHOSLOVAKMETAL will be formed, giving another example of cooperation between the CEMA countries. Czechoslovak and Mongolian geologists will primarily search the Asian continent for deposits of fluorite and asbestos. [Prague PRACE in Czech 9 Jan 81 p 3]

CSSR TURBINES FOR CHINA--Four 220-megawatt electric power turbines are being produced for export to China by the plant TURBINY of th concern enterprise SKODA PLZEN. The first unit will be tested in Plzen in the first quarter of 1981. Installation of the turbines in China will be done by Czechoslovak technicians. [Prague MLADA FRONTA in Czech 15 Jan 81 p 7]

CSO: 2402

PAPER SUMMARIZES DEBATE ON UNIVERSITIES, SCIENTIFIC RESEARCH

Budapest NEPSZABADSAG in Hungarian 10 Dec 80 pp 4-5

[Article by Denes Kovacs: "Universities and Scientific Research: Debate in MAGYAR TUDOMANY"]

[Text] One and a half years ago, a passionate polemic of Gyorgy Adam opened a wide-ranging debate on the pages of MAGYAR TUDOMANY on the role and functions of universities and colleges, the relation of universities and colleges to one another, the scientific work that is being carried out at the universities, and numerous other problems relating to this subject. The debate was concluded in November and the comments of its participants proved unanimously that the problems that were mentioned in the debate opener are "in the air," actual, and occupy the thinking of scientists, university instructors, science administrators, and, in the end, all those who feel responsible for the universities' activities. Of the exceedingly diverse debate, the popular public is likely to be the most attentive to those views that deal with the tasks and future of the universities as they relate to those proposals and concepts that aim at increasing the efficacy and success of university research.

In the debate opener, Gyorgy Adam was looking for the answer to the question, among other matters, of how universities, which occupy a central place in the scientific and cultural life of the country, fulfill their functions. His opening statement was that it has not been made clear what the tasks of universities are under the constantly changing circumstances of our society. He concluded that these institutions operate now in a crisis period and function under adverse circumstances. The root of this crisis resides in the conceptual and ideologic confusion concerning the institution of a university. Of the many comments relating to this problem, Peter Nagy dealt with the function switch of the universities and emphasized that in many countries, including this one, the framework of higher education that served the education of the elite has exploded under the pressure of mass education demands by the middle of this century. Many new, controversial, and objectionable phenomena are due to this explosion. The process cannot be stopped and "we will be able to step out of this hellish cycle only if we face the real demands of society and the real training needs of science because it is obvious that our society needs more experts with the highest qualifications than ever before."

Relating to the above, Istvan Bakos stressed that due to democratization and social equalization, among other things, the "university has become the most important training institution of not merely the intellectual elite but of all intellectuals." This is why the demands and tasks that relate to universities increase. As a result, there are hardly any countries now where they are not working on university reforms--the crisis of higher education is now a world phenomenon. One cause of the difficulties, according to one commentator, is to be found in the feeling that upward social mobility leads mainly through the universities: the fetishization of the university degree attracts the applicants in even larger numbers than necessary.

The devaluation of the university diploma is indicated, according to the debate opener, by a process which has recently been noted: many colleges have become universities in name or transformed themselves into "university type colleges" at least. The author strongly condemns the distorted view that true professional prestige is gained only from a university. In relating to the subject, Akos Csaszar argues that there should be no special distinction among these institutions on the level of their education-training work and the difference should only be in the fact that a college grants a degree in a shorter time than the university grants its diploma. Ferenc Martos agrees and emphasizes that it is not the name of an institution but its educational goals, niveau, and structure that are determinant.

Of the proposals heard in the debate that aim at solving the problems of higher-education institutions, Jozsef Herman's should be noted. He opines that the function of university training that is departmentalized and is discipline-oriented should be reexamined and a broad-based, convertible training, satisfying the changing demands, should be promoted. Another proposal of his is worthy of note and is related to the above. He states that while maintaining the duality of the universities and colleges, we should promote the integration of the various institutions, colleges, and universities. This has already been carried out in certain "two-step" programs such as engineering education. It would also enhance the rational coordination of curricula which would raise the level of teaching.

There was a lively debate centering around the research done at the universities. The evaluation of its condition and the progress of its opportunities was based on the statement of the political principles as given on the statement of the political principles as given in the 1969 resolution of the MSzMP Central Committee. These drew the attention, among other things, to the shortcomings of university research. This statement, as quoted in Istvan Bakos' comment, was reiterated in a 1977 party document. This document states that "in spite of earlier resolutions and actions, the condition of university-based research is, among all domestic research, the least favorable." In several locations, this situation endangers the basis of modern education and the execution of the training of professionals in the long term." The commenters, agreeing with this statement, emphasized in their proposals the organic unity of education and scientific research because, as Istvan Farkas wrote, "how could the university instructor teach creative thinking and life style if he himself does not acquire the modern scientific information in a creative manner?" Gyorgy Adam wrote:

"The university cannot exist as a learning and teaching institution without a high level of research activity."

The debate centered mainly around the explanation for the lag of university-produced research regarding needs and demands. The debate opener argued that the research institutes which were established in the last three decades and whose main task is research are probably less suitable to carry out steady and balanced research, in the long run, than universities are. He criticized the separate management and financing systems of the academy-connected and university-connected research apparatuses and the privileged status of the former over the latter. He sees this as the main cause of the inferior position of universities. Gyorgy Enyedi disputed the strong contrasting of the independent academic research institutes against those of the universities and warned against a single-minded explanation that the causes of mistakes are found in the differences of the material and personnel conditions. At the same time, he admitted that "the cadres and internal structure of the universities does not favor the undertaking of large research" although even in this respect the picture is quite differentiated because, among other reasons, there are people at every university (alongside the "gray education bureaucrats") who regularly carry out research and modernize their teaching notes year after year.

Most commenters admitted that we have to step forward in the improvement of the personnel and objective conditions of university research and we have to make the internal structure, spirit, and personnel of universities receptive to a broader scale of research. But the various hardships of the universities do not explain the reason why, in many areas, contact and cooperation is inadequate between universities and research institutes and universities and industrial research that serves direct, practical needs. According to Akos Csaszar, "there is a possibility for a harmonic cooperation within the present organization forms if good will and understanding prevails." Gyorgy Enyedi seconds this view: "I can give examples from my own experience of good, effective cooperation between eminent institute and university researchers. Cooperation has no special organizational obstacles."

One of the main and worthy conclusions of the broadbased debate on university research can only be that, in Istvan Bakos' phrasing, mutual rapprochement between the research institutes and universities and not an opposition stance is needed. Attention must be paid to the special nature of university-based research. The comments expressed not only a recognition of problems and difficulties but a need for change to improve the existing situation. Akos Csaszar, who approves of the revision of the research network, noted that "the only criterion of a research institute's future is the efficiency the institution shows in carrying out its work."

The debate's closing statement correctly pointed out the need for a common answer "which will obviously be followed by very important decisions and actions." This is underlined by a survey that was initiated by government agencies into the operation of research institutes and a broad-based analysis of the situation and development trends of higher education. It is hoped (we read in the closing statement) that "the expected decisions will favorable influence the progress of the research that is done at the universities." But the actions will bring desirable results only if their execution is supported by the good will of all interested parties.

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SPECIALISTS FAVOR PRODUCTION OF INTERFERON

Budapest NEPSZABADSAG in Hungarian 4 Jan 81 p 8

[Excerpts] A Hungarian Academy of Sciences ad hoc committee formed to explore possibilities, problems and tasks related to IF (Interferon) research and production has recently finished its work. The committee came into being in response to concrete proposals addressed to the Ministry of Health and the Ministry of Agriculture and Food by various factories and research institutes to the effect that Hungary should conduct IF research or adopt foreign methods of producing it. The ad hoc committee tended to favor views calling for Hungary definitely to participate in IF research without delay.

Insofar as methods were concerned, the committee leaned toward production based on the "induced leukocyte method." It felt that prospects for Hungary "to become a member of the IF producers club" were most promising since successful initiatives in the field had already been taken by the microbiological institute of Szeged university, the National Institute of Hematology and Blood Transfusion as well as the United Pharmaceutical Factory (Egyesult Gyogyszergyar].

Use of the leukocyte induction method will make enough IF available to Hungarian researchers to permit them to begin initial experiments in IF therapy. Contrary to previous reports, such experiments have not been conducted in Hungary to date. Although production of IF through genetic engineering is a more modern method, it is till relatively untested. In the opinion of the committee, the Szeged Biological Center [Szegedi Biologiai Kozpont] could evolve a technology for making IF on an industrial scale through the latter method in three or four years should it undertake to participate in such a project.

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BROAD CHANGES PLANNED IN PROFILES, DESIGNATION OF RESEARCH INSTITUTES

Budapest PARTELET in Hungarian No 1, Jan 81 pp 17-21

[Article by Mihaly Kornidesz, chief of the Department of Scientific, Public Education and Cultural Affairs of the Central Committee: "Transforming the Research Institute Network," based on a lecture given on 22 October 1980 at a national conference of research institute party secretaries]

[Text] We have a predilection for dividing what we have to do into substantive and organizational tasks. In science policy, for example, the former includes planning, financing, regulation, international contacts, cadre work, etc.; the latter involves organizational questions and the question of the research base. But this division is not precise. In the first place because every period has its central problem, the order of importance of tasks changes from time to time, and so the organizational side can be at times of determing significance. In the second place this grouping is incorrect because the questions connected with the research base are now primarily substantive and are only secondarily of an organizational character.

Even after all this the question justly arises: Why has attention been directed recently to the institutional network for research work and primarily therein only to the research institutes and not, let us say, to the universities or enterprise research sites?

I.

It is best to begin to answer this question at a little distance, taking into consideration the effect of outside factors on science. In the policy positions of recent years quality aspects have come into the fore in every area of economic and social life, and thus in science also. But does not the raising of quality aspects in connection with science involve some sort of hidden condemnation? Does it not suggest that science is not carrying out its functions satisfactorily? The 12th congress gave an unambiguous answer to this question when it said that the cultivators of science were working in a manner worthy of recognition, as a whole the results achieved in this area were adequate and the situation is basically reassuring in regard to questions deriving from the internal development of science. When the 12th congress spoke with recognition of the scientific achievements it also noted that in the future science must play a greater part in raising the cultural level of our people, in solving the tasks of education and public culture and in the development of socialist culture in general. Beyond this, greater attention

must be paid to the economic, administrative, social, etc. questions connected with science; in general to the mutual effect of science and other forms of social activity and to working on common tasks. An unavoidable factor in this is that our scientific workshops, that intellectual force which came into being in part as a result of the circumspect science policy work of recent decades, should adapt better to our social and economic goals.

The existing frameworks may be suitable for this still, our research institutes may work successfully for a time yet in the "old" manner. But the requirements are constantly increasing and the work taking place in the research base must adapt to the changing tasks both thematically and organizationally. Today this "adjustment" can be made without any real shocks, but later it will be much more difficult if not impossible to preserve continuity and at the same time satisfy the efficiency requirements.

We must prepare for an increase in the importance of the tasks and for an increase in the direct responsibility which will accompany this. Scientific life can meet the requirements coming from social and economic development only if it becomes more open, if it can be more demanding in its internal life and more flexible in its external contacts. These requirements are expressed in the Sixth Five-Year Plan, in the medium range reserach and development plans connected with this, in the priorities for technical development and in the formulation of the stressed social science themes. Naturally, when developing the research base also we must consider what immediate and longer range tasks follow from these requirements and what we must do in order to use our possibilities more rationally and more cleverly and better aid the efficiency of research and increase the social role of science.

In addition to the primarily "external" factors, a study of the research institute network is also suggested by thoughts which we might treat primarily as "internal" questions of science policy (although we know that today there is no "internal" question which would have an effect only within science policy). Perhaps the most important of these is that extensive development has lasted much too long in the area of the research base. This must be said self-critically, for the science policy guiding principles of the Central Committee put it on the agenda more than 10 years ago that intensive aspects must be made the determining ones in the development of research work. And yet during this period more than ten new research institutes were established and the number employed in research institutes grew from 28,000 to 36,000. It is not only possible but also necessary to say today that as a whole this developmental practice cannot be continued. We must go beyond the view according to which new research tasks can be solved only with new scientific forces and the creation of new institutes. We must increase concentration, the cooperation of research sites, the utilization of scientific achievements and the performance capacity of the research base. Considerable progress must be made primarily by increasing efficiency and strengthening the quality aspects of research work.

This--naturally--cannot be limited simply to modernizing the development of the research base. We must solve in a coordinated way a branching and many-sided task system. This work has begun--on the basis of the June 1977 resolution of the Political Committee--and in a number of areas new elements of development have appeared (for example, working out a national medium range research and development plan, modernizing regulation, putting license purchasing in the foreground and promoting

inventions). A part of this task system is working out the tasks of base development, an examination which has as its goal making progress in facing the existing contradictions and problems and finding possibilities for realistic solutions.

Now, however, we have not yet been able to deal with the research base as a whole. In the first place because the modernization of higher education and the enterprise organization has been the subject of other studies--concentrating on the basic functons of these organizations (education and enterprise organs oriented primarily to solving production tasks)--and obviously only after these are completed and following a clarification of operational conditions can we formulate the concrete tasks of developing the research base in these two areas. In the second place, we started the examination of the research base with the research institutes because research is the basic activity of them and if we can make progress in regard to the efficiency of work here--this being half of the entire research base--it would mean an extraordinarily significant step from the viewpoint of science as a whole. This is also important from the viewpiont of the development of industry and agriculture because even now the overwhelming majority of the research institutes have close contact with practical life. It is enough to prove this if, for example, we note the scientific work which resulted in the great increase in wheat and corn yields, the breeding of various swine hybrids or, in the technical area, the development of numerically controlled machine tools or the internationally recognized results achieved in process control.

But the successes of our research institutes cannot hide the fact that we have considerable reserves; we have greater possibilities than we make use of. Naturally, the examination which began last year and which will last for nearly a year was justified not only by the above general considerations. A role was also played by the fact that the research institute network which has developed over about 30 years has become rigid in its structure. The institutes are excessively isolated organizationally from their social environment and this holds back the swift utilization of research results. There is also a contradiction between the complex, interdisciplinary character of the problems to be solved and the disciplinary organization of the institutes. In addition, there has not come into being a joint interest with the enterprises and farms which might have improved the receptiveness to new results and this meant that the innovation chain ended within the walls of a significant number of research sites; in many cases, lacking anything better, the institute itself tried to solve the practical realization of the scientific achievement. As a result of this the ratio of production and service increased in the activity of the research base. This is partly interdependent with the experience that gave cause for anxiety in recent years, that the ratio of basic research had decreased. Stopping this tendency is an ever more urgent task.

II.

Even listing the problems awaiting solution--without at all trying to be complete--indicates that significant social and science policy interests attach to a transformation of the research base and of the research institute network therein.

Let us now look at the proposals made in the course of the study by the work committee commissioned by the Science Policy Committee.

The most important recommendation is that by the end of 1983 we must work out a comprehensive, long-range plan for the development of the research base. Developmental goals must be subordinated to research tasks and on the basis of the substantive requirements we must work out a developmental strategy for the base as a whole and for the types of research sites. In addition it seems necessary to think through and work out our base development ideas every 5 years together with the medium range planning.

The other important finding of the proposal--in accordance with the 1977 resolution of the Political Committee--is that we must strive to strengthen university and enterprise research; the research institutes must draw closer to the enterprises and farms on the one hand and to the universities on the other. Not least of all in the interest of this goal the work committee recommended the development and introduction of the "frame institute" and "development enterprise" organizational forms.

The proposed "frame institute" would be a research institute--having research as its chief function and independent in regard to its legal standing--working with a permanent research staff smaller than its full complement. It would accept researchers for a definite time on the basis of competition or invitation. The original work relationship of the invited researchers would not end but they would be paid in the "frame institute." This organizational form can be expected to encourage the creation of temporary research groups to carry out definite research tasks in the case of the social sciences and for other, possibly directly economic, research.

According to the ideas the goal and interest system and operating conditions of a "development enterprise" would be similar to those of enterprises (for example of planning institutes). Their task would be to see that research achievements came into being in a form permitting immediate application in practice, that new achievements were spread and adopted more quickly. The developmental tasks of producing enterprises would define the direction of their tasks and so they would be better forced to take over domestic and foreign achievements and do adaptive, engineering organizing work. Thus their activity could be expected to be more responsive to economic influences; the innovative preparedness and capacity of their economic environment would have a defining role in their work. Naturally care must be taken that the "development enterprises" do not become producing enterprises, thus limiting their scientific potential and innovative effect.

The proposal--which was debated by the Science Policy Committee in November and by the Council of Ministers in December--proposes modifying the research profile at 55 of 126 institutes, urges the transformation of 15 institutes into enterprises and suggests modification of the management system or organizational frameworks of a number of institutes. Further studies are being made in regard to ten institutes. The nature of the changes is indicated by the fact that they would result in reducing the number employed in the institutes from 36,000 to possibly 25,000. Taking all this into consideration the guiding organs feel that there might be some moderation in the original plan to oblige the remaining research institutes to reduce staffs by 10-15 percent.

III.

It is to be hoped that as a whole the measures will result in starting a lasting process. These efforts represent the beginning of a movement which could palpably

improve the efficiency of research and development. If progress is not to cause shocks it is indispensable that the party organizations evidence the active participation and circumspect political work already shown in the course of the preparation of the decision.

After the study was completed, but still as a part of the preparatory work, the Budapest, megye and district party committees--with the inclusion of the party and state leaders of the research institutes--took a stand on the proposals of the work committees and on those concrete ideas which affect the future of research institutes in their sphere of authority.

The inclusion of the party organs in the preparation of the decision was very useful; important proposals enriching future work came to the surface in time and a common concern was initiated to see how to work better and more effectively and how to realize the quality requirements.

We can say with assurance that in recent months there has not been or there has hardly been any phase slippage in the work of higher party organs and research institute party leaderships; where necessary direct contact was established among all affected party organs (for example, the Hungarian State Lorand Eotvos Geophysical Research Institute, the Iron Industry Research Institute, the Textile Industry Research Institute, etc.). In the course of the report membership meetings the representatives of the party organs at various levels devoted significant attention to these questions. At the same time we also found that in a few cases there was not adequate consultation with the research institute leaders and in some places this caused political tension. In these cases the errors in preparation must be corrected later.

In addition to the party organizations opinions on the ideas which had developed were given by the Presidium of the Hungarian Academy of Sciences, the expanded presidium of the National Technical Development Committee, the executive committee of the National Presidium of the MTESZ [Federation of Technical and Scientific Associations] and the Social Sciences Coordination Committee. The party and state organs fundamentally agreed with the chief aspirations. But in many cases the general agreement was coupled with a rejection of the ideas connected with the individual institutes. We found positions which were excessively loyal in regard to the institutes in their own sphere of authority while they were excessively severe in the case of proposals pertaining to outside institutes.

We must continue to deal intensively at every level with questions connected with the transformation of the research institute network. Increasingly, however, the local party organs will have the crucial role in making lasting the process which has begun.

We expect our party organizations to deal with the developmental tasks of their institutes with a view which has a broader horizon and takes into consideration the larger interdependencies. We consider it important that they make the party members and non-party people understand the essence of the measures so that they will find what is needed for higher quality, more efficient work and understand that professional-political preparation, talent proven in practice, maturity and creativity are the only standards for judging and recognizing work.

Our party organizations must turn greater attention than ever before to seeing that the most talented people can prove their creativity in everyday work. In addition and parallel with this they must face, very circumspectly but with determination, the problem that those who cannot keep up with the requirements in scientific research and development work should find opportunities, jobs and places of work where they can be more useful and better rewarded members of society.

We must work together to modify our scale of values together with the changing tasks, giving greater recognition to activity which is useful to society. Our evaluating, supervising work must be put on more realistic foundations, closer to man, and we must strive to see that prestige is given not by belonging to some institute but rather by the actual results of work, by the performance achieved.

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BRIEFS

COLLOID RESEARCH TARGETS--In a recent press interview, Ervin Wolfram, university professor, head of the department of colloid chemistry and colloid technology of the Lorand Eotvos University of Science, revealed that his department is currently emphasizing three lines of research: the first deals with boundary surface phenomena as they relate to oil research; the second concerns the stability of colloid systems. In this area efforts are being made to optimize the effects of plant protective agents. Polymer colloids having giant molecules are the third stressed field. In conjunction with the Borsod Chemical Combine, the department developed a protective colloid substance which, when imbedded in giant PVC molecules, results in formation of granules of optimally usable size. Further, the department has evolved a technology now used in industry which potentiates the effect of enzymes by binding them to the gelatinous vehicle or base. [Text] [Budapest MAGYAR HIRLAP in Hungarian 11 Jan 81 p 11]

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ACADEMY OF SCIENCES REPORTS ON MANIFESTATIONS OF 'SOCIAL PATHOLOGY'

AU241156 Warsaw SZTANDAR MLODYCH in Polish 19 Nov 80 pp 1, 2

[PAP report: "The Polish Academy of Sciences Presidium in Session--Expertise Report on Manifestations of Social Pathology"]

[Text] As in every country, negative manifestations assert themselves in Poland side by side with positive manifestations, but the former have recently become quite abundant. They include the manifestations of social pathology, which have been passed over in embarrassing silence up to now. Scientists have warned and are warning against the results of those manifestations. Following the previous three expertises on this subject--these expertises have been almost ignored by the authorities in the past 20 years--the Polish Academy of Sciences has prepared a fourth expertise report on manifestations of social pathology in Poland. The academy's presidium discussed that expertise report on 18 November.

The expertise report, which was produced by the academy's committee for research and forecasts "Poland 2000" on the strength of 1978-1980 research, limits itself to a general description of the manifestations of social pathology in our country and discusses alcoholism, criminality, nicotine and drug addiction and prostitution.

Here are some of the most crucial data taken from the expertise report numbering almost 200 pages.

In the view of scientists alcoholism is one of the biggest social plagues, the extent and results of which are being diminished in society's consciousness.

The expertise report draws attention to the greatly expanded economic criminality, which is being prosecuted with relative feebleness and very selectively.

Nicotine addiction: The cigarette smoke contains about 300 known substances that are harmful to health and that are instrumental in causing over 20 diseases. Nevertheless, the consumption of cigarettes in Poland is increasing.

In the view of the authors of the expertise report, drug addiction is a peripheral and rare manifestation in Poland. Its extent is being exaggerated by public opinion.

The expertise report also deals with prostitution and with the measures to counter it. The number of prostitutes has been about the same since 1974 and amounts to 10,000 to 12,000.

The academy's presidium also discussed organizational issues connected with the ending term of the present authorities and with the election of the new ones.

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